

## Math 220 - Calculus f. Business and Management - Worksheet 8

### Worksheet 8 - Composite and Multivariable Functions

#### Composition of functions

*Exercise 1: Compose these pairs of functions into a single function*

$$1A : C(q) = 5q + 2500; \quad q = q(p) = 1500 - p; \quad C(q(p)) = ?$$

$$1B : f(y) = \ln(y + 5); \quad y = y(x) = 6x^2 - 3x + 5; \quad f(y(x)) = ?$$

$$1C : V(r) = (4/3)\pi \cdot r^3; \quad r = r(t) = 3t; \quad V(r(t)) = ?$$

$$1D : R(q) = 100q - \ln(q/100); \quad q = q(p) = \sqrt{250 - p}; \quad R(q(p)) = ?$$

#### Decomposition of functions

*Exercise 2: Decompose these functions into two (or more) separate functions.*

$$2A : f(g(x)) = \sqrt{\ln x}; \quad 2B : v(h(t)) = e^{6t}; \quad 2C : s(m(h)) = (h^3 + 4h - 7)^5;$$

$$2D : a(b(x)) = e^{5x+7}; \quad 2E : h(s(w(x))) = \ln \sqrt{4x^2 - 3x};$$

#### Multivariable Word Problems

*Exercise 3: The length of a rectangle is 3 times as long as its width. Express the area of the rectangle three ways. First as a function of the length and width. Second as a function of the width only. Third as a function of the length.*

*Exercise 4: The height of a cylinder is 5 times its radius. Express the volume of the cylinder as a function of the height and radius. Then express it as a function of the height only. Finally express it as a function of the radius only.*

*Exercise 5: Using the measurements from exercise 4, express the total area of the cylinder (sides and top and bottom) three ways.*